

## **Modeling Impacts of Opacity Violations and Related Particulate Emissions from Mystic Station on Air Quality in Environmental Justice Areas**

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The Mystic Station power plant, located in Everett, Massachusetts, has experienced a long history of opacity (visible emission) air violations that contain particulates that can trigger asthma and other respiratory illnesses. The Office of Environmental Stewardship (OES) of EPA Region I carried out an enforcement action to eliminate the violations. Establishing the significance of the opacity violations and their relationship to particulate emissions were important issues in the case. The case team decided to determine the impact of opacity violations and associated particulate loadings at the Mystic Station on residents of Potential Environmental Justice (EJ) areas. The OES Air Technical Unit and Legal/Regulatory Units worked with the Air Permitting and Air Quality Planning Units of the Office Of Ecosystem Protection (OEP), and the Office of Administration and Resources Management (OARM) to develop an approach. The team decided to: 1) model ground-level impacts of opacity violations on air quality (total particulate and PM2.5 concentrations) using an air quality dispersion model, and 2) overlay the areas with elevated particulate levels with Potential EJ areas to see if these areas would be affected by the plume, and the number of people affected, using Geographic Information System (GIS) ARC-INFO software and demographic information.

The air quality dispersion model used was the HYSPLIT Model, available on the National Oceanographic and Atmospheric (NOAA) website. The HYSPLIT model outputs concentration contours and the point of highest concentration, using the weather conditions specific to a particular date and time. Working with OES, OEP staff did numerous model runs on different days when opacity violations occurred. Two rounds of modeling were conducted: an initial round for total particulate using available sampling data, and a subsequent round for PM2.5 using an updated HYSPLIT model and new particulate emission and particle size distribution data from a sampling program conducted for the project. The maximum impact modeled was an increase of 6.9 micrograms per cubic meter in PM2.5 levels on December 10, 2001. The GIS overlay done by OARM's GIS staff with 1990 census data showed that the total population affected by elevated PM2.5 levels on this date was approximately 234,000; 103,000 (42%) lived in Potential EJ areas. The analysis indicated that there was a significant impact on the potential EJ areas and the overall region. It was useful in conveying the importance of the enforcement action within EPA and in negotiations with the company. Analysis of this kind could be useful in permitting decisions and other enforcement cases.